a third output device to switch a connection state of the power recovery circuit to a state in which power is supplied from the power recovery circuit to the capacitance of the plasma display panel; and

a fourth output device to switch a connection state of the power recovery circuit to a state in which the power is recovered from the capacitance of the plasma display panel to the power recovery circuit, and

C11 cont.

wherein the first and second phase adjusting circuits adjust the timing of the changing edges of the first and second driving signals to prevent a time difference between turning on of the third output device of said respective X or Y sustaining circuit and turning on of the first output device thereof, and a time difference between a turning on of the fourth output device of said respective X or Y sustaining circuit and turning on of the second output device thereof.

REMARKS

INTRODUCTION

Claims 3-4, 7, 10 and 13-15 are objected to but are indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1-2, 5-6, 8-9, 11-12 and 16 stand rejected. By this Response, claims 17-19 are added. Thus, claims 1-19 are now presented for consideration.

No new matter is presented in the foregoing new claims 17-19, accordingly, approval and entry of same are submitted to be proper and are respectfully solicited.

INCORPORATION BY REFERENCE OF RESPONSE FILED APRIL 15, 2003

Applicant herein incorporates by reference the Response filed April 15, 2003. Reconsideration is respectfully requested, since claims 1-16 are submitted to be allowable for the reasons stated in the Response.

INCOMPLETE RESPONSE BY EXAMINER

MPEP § 707.07(f) states that "[w]here the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it."

The Examiner has not provided an answer which complies with MPEP § 707.07(f). For

example, Applicants argued in the Response filed April 15, 2003: that, contrary to the invention recited in claim 1, Kim discloses only adjustment of changing edges of driving signals of a *power recovery circuit*, and does not disclose or suggest first and second phase adjusting circuits that adjust timing of changing edges of *driving signals of first and second output devices. (Emphasis added)*; that the Examiner's assertion that Kim discloses the ALIS type plasma display apparatus in FIGS. 1 and 2 is incorrect, since to realize the ALIS type plasma display apparatus in which display lines are formed at both sides of second (Y) electrodes, two X sustaining circuits and two Y sustaining circuits are necessary as shown in Fig. 4 of the present application; and that Marcotte discloses a display panel sustain circuit in which an energy recovery operation is precisely controlled and signal transitions are automatically adjusted to be optimum in an apparatus, thus, the concept of Marcotte is completely different from that of the invention recited in claim 9.

NEW CLAIM 17-19

New claims 17-19 are added to provide a varying scope of protection.

New dependent claims 17 and 18 are submitted to be allowable based on their dependency on claim 1, as well as for the additional recitations therein.

New independent claim 19 is submitted to be allowable for at least similar reasons as those of claim 1, well as for the additional recitations therein. In particular, claim 19 recites additional patentable distinctions beyond those of claim 1, namely, that "the first and second phase adjusting circuits adjust the timing of the changing edges of the first and second driving signals to prevent a time difference between turning on of the third output device of said respective X or Y sustaining circuit and turning on of the first output device thereof," and furthermore, that "a time difference between a turning on of the fourth output device of said respective X or Y sustaining circuit and turning on of the second output device thereof."

Consideration and approval is respectfully requested

CONCLUSION

It is respectfully submitted that the pending claims patentably distinguish over the art of record and, there being no other objections or rejections, that the application is in condition for allowance, which action is respectfully solicited.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 6/16/03

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CERTIFICATE UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
on June 16, 2003
STAAS & HALSEY
By Regina Knight
Date: 6/16/03

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please ADD new claims 17-19 as follows, and the remaining pending claims are provided below for the convenience of the Examiner.

1. (AS TWICE AMENDED) A plasma display apparatus, comprising:

a plasma display panel equipped with first electrodes and second electrodes arranged adjacently to each other, extending in a first direction, and address electrodes extending in a second direction at a right angle to the first direction;

an X sustaining circuit that supplies sustaining pulses to said first electrodes;

a Y sustaining circuit that supplies sustaining pulses to said second electrodes, wherein said X and Y sustaining circuits respectively comprise:

a first output device provided between a path connected to said first or second electrodes and a high potential power supply,

a second output device provided between the path connected to said first or second electrodes and a low potential power supply,

a first phase adjusting circuit that adjusts timing of a changing edge of a driving signal which drives said first output device, and

a second phase adjusting circuit that adjusts timing of a changing edge of a driving signal which drives said second output device.

2. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 1, wherein the X sustaining circuit and the Y sustaining circuit include power recovery circuits each of which has a resonant circuit formed with a display capacitor of the plasma display panel, recovers energy when an application of the sustaining pulse is released and uses the recovered energy for a next application of the sustaining pulses, is provided.

3. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 2, wherein the X sustaining circuit and the Y sustaining circuit comprise the first and the second output devices connected between a path through which the sustaining pulses are supplied and a high voltage power source line, and between the path and a low voltage power source line, respectively, a third output device that switches a connection state of the path and the power

recovery circuit to a state in which power is supplied from the power recovery circuit to the path, a fourth output device that switches the connection state of the path and the said power recovery circuit to a state in which power is recovered from the path to the power recovery circuit, and a first drive circuit through a fourth drive circuit that drive the first through the fourth output devices, respectively; and a phase adjusting circuit to adjust a time difference between a turning on of the third output device and that of the first output device, and a time difference between a turning on of the fourth output device and that of the second output device.

4. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 3, wherein the phase adjusting circuit comprises the first phase adjusting circuit, the second phase adjusting circuit, a third phase adjusting circuit and a fourth phase adjusting circuit provided at a stage preceding the first drive circuit through the fourth drive circuit, respectively.

5. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 1, wherein the plasma display panel forms a first display line between one side of one of the second electrodes and one adjacent electrode of the first electrodes, a second display line between another side of the one second electrode and another adjacent electrode of the first electrodes, and forms a display field of a frame by plural subfields, and provides a gray scale by combining said subfields selectively for display; the X sustaining circuit is equipped with a first X sustaining circuit that supplies the sustaining pulse to an odd-numbered electrode of the first electrodes, and a second X sustaining circuit that supplies the sustaining pulse to an even-numbered electrode of the first electrodes; and the Y sustaining circuit is equipped with a first Y sustaining circuit that supplies the sustaining pulse to an odd-numbered electrode of the second electrodes, and a second Y sustaining circuit that supplies the sustaining pulse to an even-numbered electrode of the second electrodes.

6. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 5, wherein the first X sustaining circuit and the second X sustaining circuit and the first Y sustaining circuit and the second Y sustaining circuit are equipped with phase adjusting circuits, respectively; and a difference in rising or falling timing between the sustaining pulse output by the first X sustaining circuit and that output by the first or the second Y sustaining circuit, and a difference in rising or falling timing between the sustaining pulse output by the second X

sustaining circuit and that output by the first or the second Y sustaining circuit are adjusted so that the differences of the timings are within a predetermined range.

7. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 6, wherein the predetermined range is within ±30 ns.

8. (AS ONCE AMENDED) The plasma display apparatus, as set forth in claim 1, wherein a phase adjusting circuit is set by observing a waveform when the sustaining pulse is applied to the first or second electrode of the plasma display panel.

9. (AS ONCE AMENDED) A manufacturing method of a plasma display apparatus comprising a plasma display panel having first electrodes and second electrodes arranged adjacently to each other, extending in a first direction, and address electrodes extending in a second direction at a right angle to the first direction, an X sustaining circuit that supplies a sustaining pulse to said first electrodes, and a Y sustaining circuit that supplies a sustaining pulse to said second electrodes, wherein delay times of circuit devices with respect to signals, which form the X sustaining circuit and the Y sustaining circuit, are measured and the circuit devices are classified according to the delay times; sets of the classified circuit devices are selected so that a timing of a changing edge of each said sustaining pulse falls within a predetermined allowance; and the sets of the selected circuit devices are provided for the plasma display apparatus.

10. (AS ONCE AMENDED) A manufacturing method of a plasma display apparatus, as set forth in claim 9, wherein said plasma display panel forms a first display line between one side of one of the second electrodes and one adjacent electrode of the first electrodes, a second display line between another side of the one second electrode and another adjacent electrode of the first electrodes, forms a display field of a frame by plural subfields, and provides a gray scale by combining said subfields selectively for display; the X sustaining circuit is equipped with a first X sustaining circuit that supplies the sustaining pulse to an odd-numbered electrode of the first electrodes, and a second X sustaining circuit that supplies the sustaining pulse to an even-numbered electrode of the first electrodes; the Y sustaining circuit is equipped with a first Y sustaining circuit that supplies the sustaining pulse to an odd-numbered electrode of the second electrodes, and a second Y sustaining circuit that supplies the sustaining pulse to an even-

numbered electrode of the second electrodes; and a difference in rising or falling timing between the sustaining pulse output by the first X sustaining circuit and that output by the first or the second Y sustaining circuit, and a difference in rising or falling timing between the sustaining pulse output by the second X sustaining circuit and that output by the first or the second Y sustaining circuit are adjusted so that the differences of timings are within a predetermined range, when the circuit devices of the first and second X sustaining circuits and the first and second Y sustaining circuits are selected.

~~11.~~ 13. (AS TWICE AMENDED) A plasma display apparatus having a plasma display panel with first electrodes and second electrodes arranged adjacently to each other, extending in a first direction, and address electrodes extending in a second direction at a right angle to the first direction, comprising:

X and Y sustaining circuits to supply sustaining pulses to said first electrodes and said second electrodes, respectively, wherein said X and Y sustaining circuits respectively comprise:

a first output device,

a second output device, the first and second output devices of respective X and Y sustain circuits generating sustaining pulses,

a first phase adjusting circuit to adjust timing of a changing edge of a first driving signal which drives said first output device, and

a second phase adjusting circuit to adjust timing of a changing edge of a second driving signal which drives said second output device.

~~12.~~ 14. (AS UNAMENDED) The plasma display apparatus, as set forth in claim ~~11~~ 13, wherein the X sustaining circuit and the Y sustaining circuit, respectively, further comprising:

a power recovery circuit having a resonant circuit formed with a display capacitor of the plasma display panel to recover energy of an applied sustaining pulse for an application in a subsequent sustaining pulse.

~~13.~~ 15. (AS UNAMENDED) The plasma display apparatus, as set forth in claim ~~12~~ 14, wherein the X sustaining circuit and the Y sustaining circuit, respectively, further comprise:

one of a first connection between a high voltage power source line and the first and the second output devices and a second connection between a low voltage power source line and the first and the second output devices to supply and recover energy from the sustaining pulses.

14. 16 (AS UNAMENDED) The plasma display apparatus, as set forth in claim 13, 15 wherein the X sustaining circuit and the Y sustaining circuit, respectively, further comprise:

a first drive circuit through a fourth drive circuit that drive the first output device through the fourth output device, respectively; and a phase adjusting circuit to adjust a time difference between a beginning of an on-state of the third output device and a beginning of an on-state of the first output device, and a time difference between a beginning of an on-state of the fourth output device and a beginning of an on-state of the second output device.

15. 17 (AS UNAMENDED) The plasma display apparatus, as set forth in claim 14, 16 wherein the phase adjusting circuit comprises the first phase adjusting circuit, the second phase adjusting circuit, a third phase adjusting circuit and a fourth phase adjusting circuit provided at a stage preceding the first drive circuit through the fourth drive circuit, respectively.

16. 18 (AS UNAMENDED) A method of manufacturing a plasma display apparatus having X and Y sustaining circuits to supply sustaining pulses to first electrodes and second electrodes, respectively, comprising:

measuring delay times of circuit devices which form the X sustaining circuit and Y sustaining circuit with respect to signals;

selecting sets of the circuit devices so that a timing of a changing edge of each said sustaining pulse falls within a predetermined allowance; and

providing the selected sets of the circuit devices to the plasma display apparatus.

17. (NEW) The plasma display apparatus, as set forth in claim 1, wherein the first phase adjusting circuit phase-shifts the first driving signal which drives said first output device, and the second phase adjusting circuit phase-shifts the second driving signal which drives said second output device.

19. (NEW) The plasma display apparatus, as set forth in claim 17, wherein:

the first phase shifting circuit comprises:

a first output signal detecting circuit to detect an output of the first output device, and

a first phase difference detecting circuit determining the phase difference between the first driving signal and the output of the first output device to adjust the phase delay of the first phase adjusting circuit for a delay time of the first output device; and

the second phase shifting circuit comprises:

a second output signal detecting circuit to detect an output of the second output device, and

a second phase difference detecting circuit determining the phase difference between the second driving signal and the output of the second output device to adjust the phase delay of the second phase adjusting circuit for a delay time of the second output device.

19. (NEW) A plasma display apparatus, comprising:

a plasma display panel equipped with first electrodes and second electrodes arranged adjacently to each other, extending in a first direction, and address electrodes extending in a second direction at a right angle to the first direction;

an X sustaining circuit that supplies sustaining pulses to said first electrodes using a first drive signal;

a Y sustaining circuit that supplies sustaining pulses to said second electrodes using a second driving signal, wherein said X and Y sustaining circuits respectively comprise:

a first phase adjusting circuit to adjust timing of a changing edge of a first driving signal, and outputting a first timing adjusted driving signal,

a second phase adjusting circuit to adjust timing of a changing edge of a second driving signal, and outputting a second timing adjusted driving signal,

a first output device turning on and turning off in response to the first timing adjusted driving signal, and provided between a path connected to said first electrode or said second electrode and a high potential power supply,

a second output device turning on and turning off in response to the second timing adjusted driving signal, and provided between the path connected to said first electrode or said second electrode and a low potential power supply, the first and second output devices producing and outputting the sustaining pulses by reciprocally and alternatingly turning on and turning off,

a power recovery circuit employing a capacitance of the plasma display panel to recover energy when a first application of the sustaining pulses occurs and to supply the recovered energy in a next application of the sustaining pulses,

a third output device to switch a connection state of the power recovery circuit to a state in which power is supplied from the power recovery circuit to the capacitance of the plasma display panel; and

a fourth output device to switch a connection state of the power recovery circuit to a state in which the power is recovered from the capacitance of the plasma display panel to the power recovery circuit, and

wherein the first and second phase adjusting circuits adjust the timing of the changing edges of the first and second driving signals to prevent a time difference between turning on of the third output device of said respective X or Y sustaining circuit and turning on of the first output device thereof, and a time difference between a turning on of the fourth output device of said respective X or Y sustaining circuit and turning on of the second output device thereof.